Name: _____

ULID: _____

Please write complete step by step solutions (whenever possible) to the problems below. Note that log **without the base specified is interpreted to be logarithm with base 10**

1. Find the exact values of x for the following equations:

   (a) $log_2(x) = -3$

   (b) $log_3(81) = x$

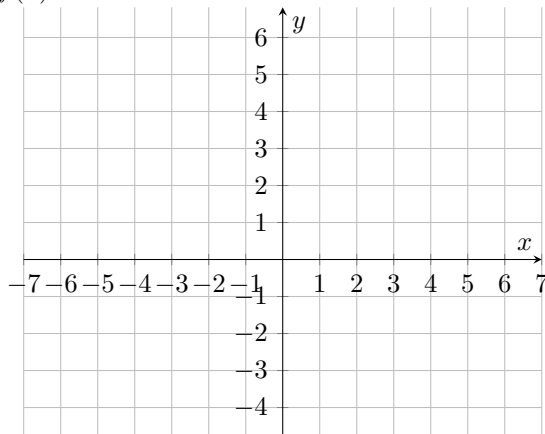   (c) $log_x(6) = \frac{1}{3}$

   (d) $log_{x^2}(4) = -1$

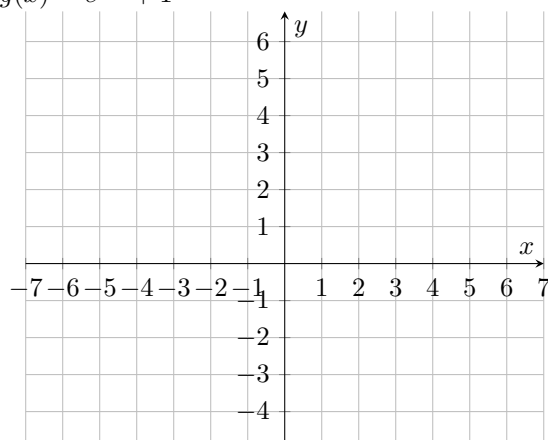   (e) $log_{x-1}(4) = 2$

2. Graph the exponential functions using **transformations**. Write down the trasformations you performed and mention the order in which you execute them. Make sure to draw the asymptote.

   (a) $f(x) = 2^{x+1} + 2$

(b) $g(x) = e^{-x} + 1$

3. Write each expression as a sum or difference of $\log(x)$, $\log(y)$ and $\log(z)$..

   (a) $\log(x^2\sqrt{y})$

   (b) $\log\left(\frac{x^2\sqrt{z}}{y^{\frac{1}{3}}}\right)$

4. Write each expression as a single logarithm.

   (a) $\log(x) - 3\log(y) + \frac{1}{2}\log(z)$

   (b) $\log(x) - \log(y) + 3\log(z^2) - \log(7)$

5. Solve each equation exactly. Decimal values are not needed.

   (a) $2^{x-1} = 8$

(b) $3^{3x+1} = 71$

(c) $2^{5x+4} = 2^{x-1}$

6. Solve the following equations exactly. Decimal values are not needed.

   (a) $log_3(9x) - log_3(x-8) = 4$

   (b) $ln(2x+9) = -2$

   (c) $log_8(x) = -\frac{1}{3}$

7. If \$7500 is invested in a savings account earning 5% interest compouned quarterly, how much money will you have in the account in 20 years?

8. How much money should you put into a savings account now that earns 6% interest compunded continuously, if you want to have \$100,000 in 20 years? Round to the nearest cent.

9. The half life of Uranium-238 is given by the formula

$$A = A_0 e^{-0.1540t}$$

where, A_0 is the initial amount of Uranium-238, and A is the amount remaining after t yearas.. If a rock contains 98% of its initial amount, how old is the rock?

BONUS PROBLEM

An absent-minded bank teller switched the dollars and cents when he cashed a check for Mr. Brown, giving him dollars instead of cents, and cents instead of dollars. After buying a five-cent newspaper, Brown discovered that he had left exactly twice as much as his original check. What was the amount of the check?